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#### STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAYS** GEOTECHNICAL ENGINEERING UNIT

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SHEET NO.

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**DESCRIPTION** 

SITE PHOTOGRAPHS

TITLE SHEET

# **STRUCTURE** SUBSURFACE INVESTIGATION

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STATE PROJECT REFERENCE NO. 22 17BP.8.R.121

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THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1991 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

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  1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.

  2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

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PROJECT REFERENCE NO.

17BP.8.R.121

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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

# SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION	<u>UNIFORMLY GRADED</u> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. <u>GAP-GRADED</u> - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60	<u>AQUIFER</u> - A WATER BEARING FORMATION OR STRATA.
IS BASED ON THE AASHTO SYSTEM, BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6 SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.  ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
CENERAL CRANIII AR MATERIALS SILT-CLAY MATERIALS	MINERALOGICAL COMPOSITION	FINE TO COARSE CRAIN IGNEOUS AND METAMORPHIC POCK THAT	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND
CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200) ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	CRYSTALLINE WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE,	SURFACE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
CLASS. A-1-6 A-1-6 A-2-4 A-2-5 A-2-6 A-2-7 A-7-5 A-3 A-6, A-7	COMPRESSIBILITY  SLIGHTLY COMPRESSIBLE LL < 31	ROCK (NCR)  SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
SYMBOL 00000d0000cc social soc	MODERATELY COMPRESSIBLE LL = 31 - 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED
7. PASSING SILT-	HIGHLY COMPRESSIBLE LL > 50  PERCENTAGE OF MATERIAL	SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.	BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
*18 50 MX GRANULAR CLAY MUCK, SOILS SOILS SOILS SOILS SOILS	GRANULAR SILT - CLAY	WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
*200   15 MX   25 MX   10 MX   35 MX   35 MX   35 MX   36 MN   36 MN   36 MN   36 MN   36 MN	ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
MATERIAL PASSING *40	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20%	HAMMER IF CRYSTALLINE.	HORIZONTAL.
LL -   -   40 MX   41 MN   11TIE OB	MODERATELY ORGANIC         5 - 10%         12 - 20%         SOME         20 - 35%           HIGHLY ORGANIC         > 10%         > 20%         HIGHLY         35%         AND ABOVE	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, (V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
PI 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN MODERATE DECANIC	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE  GROUND WATER	OF A CRYSTALLINE NATURE.	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH,  FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
GROUP INDEX 0 0 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF SOILS		SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO  (SLI.) 1 INCH. DPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
OF MAIDE GRAVEL AND FINE SILTY OR CLAYEY SILTY CLAYEY MATTER	▼ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SAND GRAVEL AND SAND SOILS SOILS	▼ STATIC WATER LEVEL AFTER <u>24</u> HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
GEN, RATING AS SUBGRADE EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE		(MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	PARENT MATERIAL.
AS SUBLIKABLE   PUUR   PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30	SPRING OR SEEP	WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.  FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION, ROCK SHOWS SEVERE LOSS OF STRENGTH	FIELD.
COMPACTNIESS OR RANGE OF STANDARD RANGE OF UNCONFINED	ED SEASE	(MOD.SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK, ROCK GIVES "CLUNK" SOUND WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE CONSISTENCY PENETRATION RESISTENCE COMPRESSIVE STRENGTH (N-VALUE) (TONS/FT <sup>2</sup> )	ROADWAY EMBANKMENT (RE)  25/025  DIP & DIP DIRECTION  WITH SOIL DESCRIPTION  OF ROCK STRUCTURES	IF TESTED, WOULD YIELD SPT REFUSAL  SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
VERY LODGE / /	SPT ST DODING SLOPE INDICATOR	(SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
GENERALLY LOOSE 4 TO 10  GRANULAR MEDIUM DENSE 10 TO 30 N/A	SOIL SYMBOL  OPT ONT TEST BORING  INSTALLATION	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.  IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS
MATERIAL DENSE 30 TO 50 (NON-COHESIVE) VED PENSE 50	ARTIFICIAL FILL (AF) OTHER AUGER BORING CONE PENETROMETER THAN ROADWAY EMBANKMENT AUGER BORING TEST	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
VERT DENSE 2 200		SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK (V SEV.) REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.
VERY SOFT < 2 < 0.25  GENERALLY SOFT 2 TO 4 0.25 TO 0.5	INFERRED SOIL BOUNDARY — CORE BORING SOUNDING ROD	VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0	INFERRED ROCK LINE  MONITORING WELL  TEST BORING WITH CORE	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
MATERIAL   STIFF   8 TO 15   1 TO 2	PIEZOMETER SPT N-VALUE	SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
HARD > 30 > 4	INSTALLATION	ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES	ROCK.
U.S. STD. SIEVE SIZE 4 10 40 60 200 270  OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE ACCEPTABLE, BUT NOT TO BE	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO
COARSE FINE	SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
BUULDER CUBBLE GRAVEL SAND SAND SILI CLAY	UNDERCOT LEED HOUSE DECRHOHBLE ROCK	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
(CSE. SD.) (F SD.)	ABBREVIATIONS	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.	OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.05 0.005 SIZE IN. 12 3	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL
SOIL MOISTURE - CORRELATION OF TERMS	CL CLAY MOD MODERATELY $\gamma$ - UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
SOU MOISTURE SCALE FIELD MOISTURE	CPT - CONE PENETRATION TEST NP - NON PLASTIC 7d - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC	POINT OF A GEOLOGIST'S PICK.  SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY
(ATTERBERG LIMITS)  DESCRIPTION  GUIDE FOR FIELD MOISTURE DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <u>SAMPLE ABBREVIATIONS</u>	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	PIECES CAN BE BROKEN BY FINGER PRESSURE.	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY
(SAT.) FROM BELOW THE GROUND WATER TABLE	F - FINE SL SILT, SILTY ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
PLASTIC SEMISOLID, PEOLITIES DEVINE TO	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
RANGE ATTAIN OPTIMUM MOISTURE	FRAGS FRAGMENTS $w$ - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING	BENCH MARK: NA
" PLL + PLASTIC LIMIT -	HI HIGHLY V - VERY RATIO  EQUIPMENT USED ON SUBJECT PROJECT	TERM SPACING TERM THICKNESS  VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	SI SIVATION NO SEST
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET	ELEVATION: NA FEET
SL SHRINKAGE LIMIT	X CME-45C CLAY BITS X AUTOMATIC MANUAL	MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET	NOTES:
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	CLEONITINUOLE FLICHT AUCED	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	BORING ELEVATIONS OBTAINED USING 620063_Is_tnl.tin DATED 6-I3-20I7
	■   CME-55   □   COME SIZE:	THINLY LAMINATED < 0.008 FEET  INDURATION	1
PLASTICITY		FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	1
PLASTICITY INDEX (PI) DRY STRENGTH  NON PLASTIC 0-5 VERY LOW	CME-550 HARD FACED FINGER BITS  TUNGCARBIDE INSERTS  X -N Q2	RUBBING WITH FINGER FREES NUMEROUS GRAINS;	
SLIGHTLY PLASTIC 6-15 SLIGHT	VANE SHEAR TEST ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	FRIABLE GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH	CASING W/ ADVANCER POST HOLE DIGGER	MODERATELY INDURATED  GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE;  PROBLEM FACILITY HANDED	
COLOR	PORTABLE HOIST TRICONE STEEL TEETH HAND AUGER	BREAKS EASILY WHEN HIT WITH HAMMER.	
	TRICONE 'TUNGCARB. SOUNDING ROD	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE: DIFFICULT TO BREAK WITH HAMMER.	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).  MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.	X CORE BIT VANE SHEAR TEST	EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE;	
HODELIENS SOUTH AS ELOTT, DANK, STREAMED, ETC. HAE USED TO DESCRIBE HEFERMANCE.	<u> </u>	SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14

PROJECT REFERENCE NO.

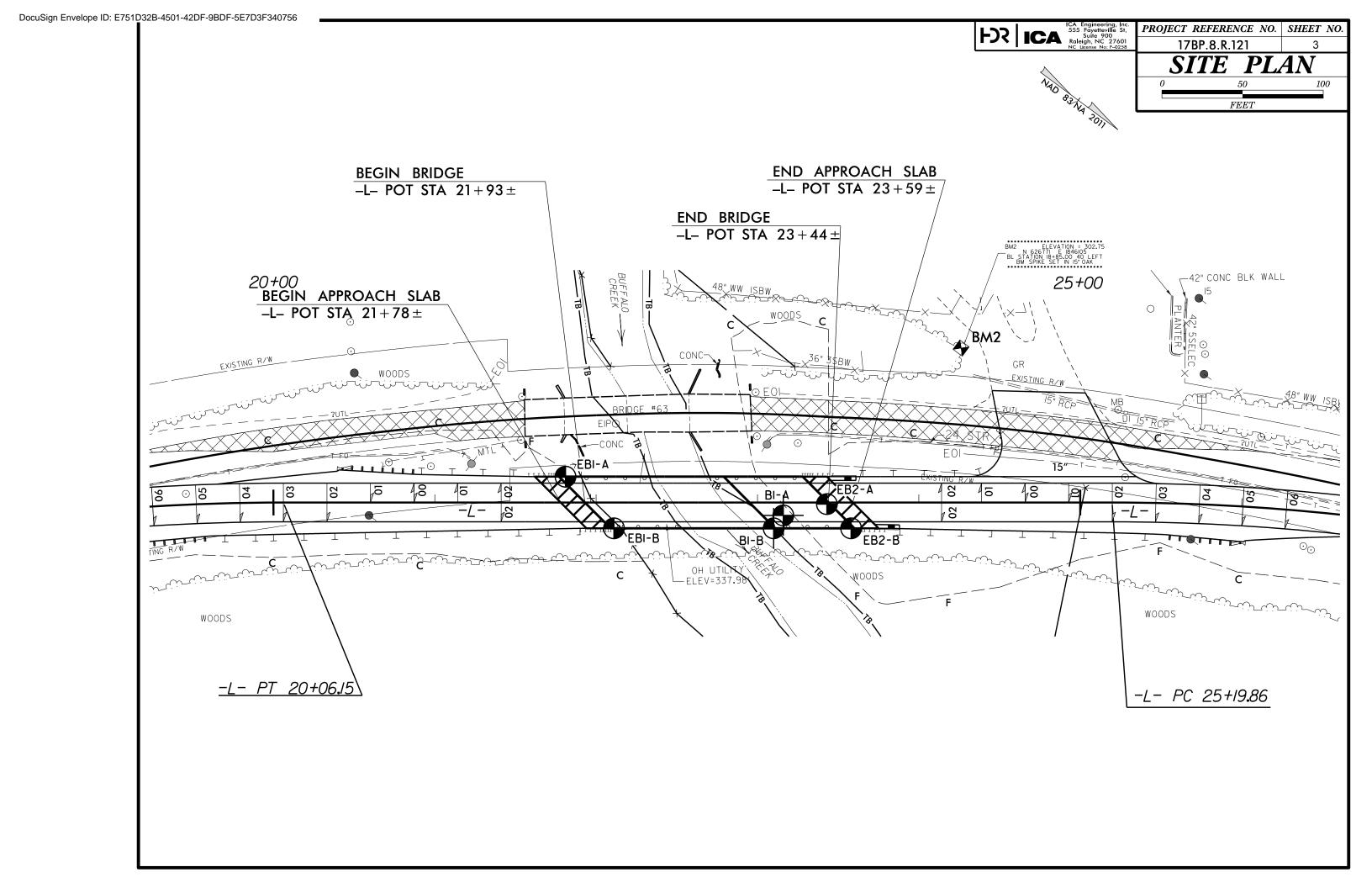
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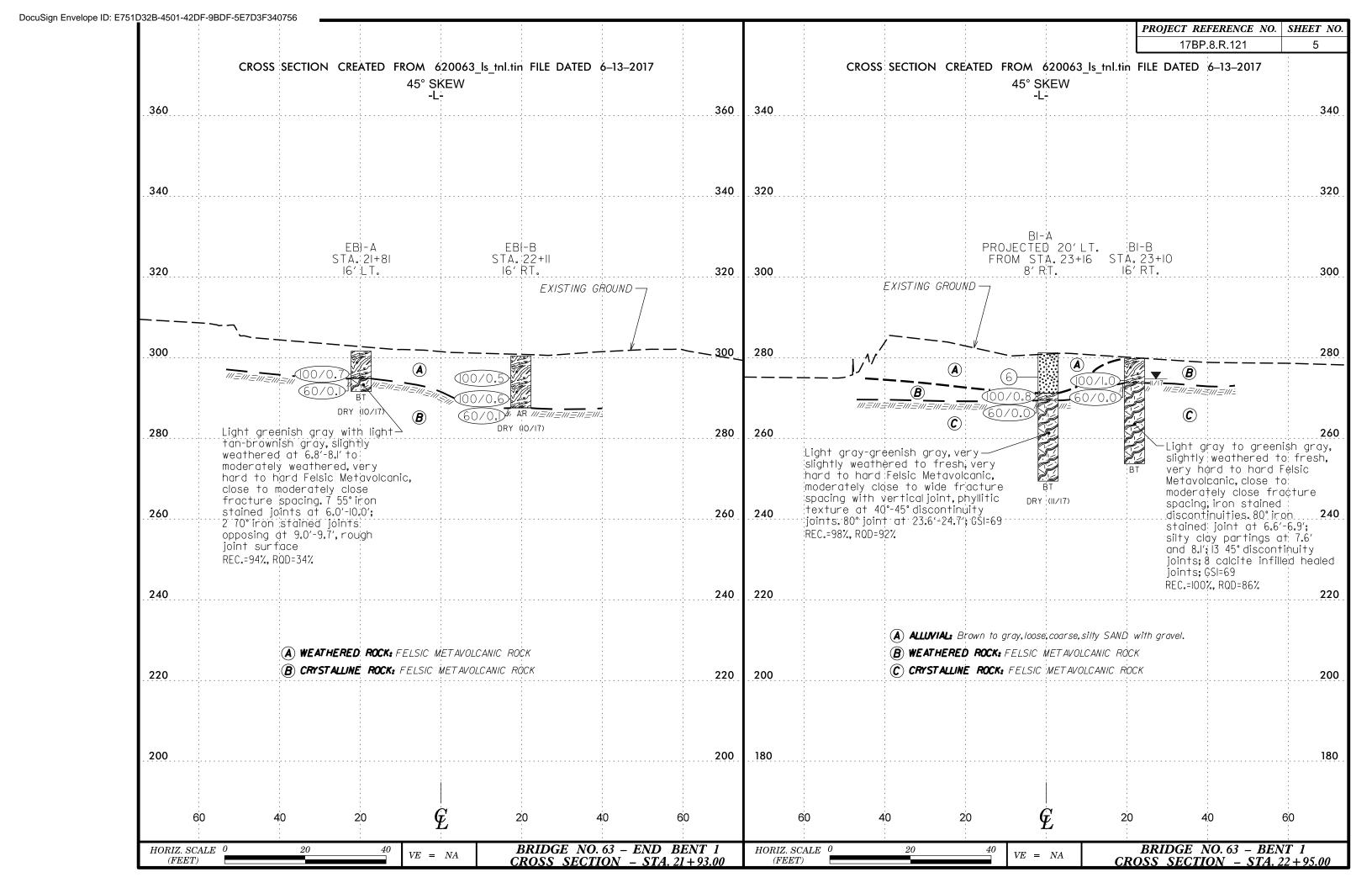
17BP.8.R.121

# NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

# SUBSURFACE INVESTIGATION

	SUPPLEMI FR	ENTAL LEGEND, GE OM AASHTO LRFI	OLOGIC D BRID	AL STRENGTH INDEX (GSI) TABLES GE DESIGN SPECIFICATIONS			
AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointo	d Rock Mass (Marinos and Hoek,	2000)		AASHTO LRFD Figure 10.4.6.4-2 $-$ Determination of GSI for Tectonically Def	ormed Heterogeneous Rock	Masses (Marinos and	Hoek, 2000)
	SURFACE CONDITIONS  VERY GOOD  Very rough, fresh unweathered surfaces  COOD  Rough, slightly weathered, iron stained surfaces	Smooth, moderately weathered and altered surfaces POOR Slickensided, highly weathered surfaces with compact coatings or fillings or angular fragments	<b>VERY POOR</b> Slickensided, highly weathered surfaces with soft clay coatings or fillings	GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos. P and Hoek E., 2000)  From a description of the lithology, structure and surface conditions (particularly of the bedding planes), choose a box in the chart. Locate the position in the box that corresponds to the condition of the discontinuities and estimate the average value of GSI from the contours. Do not attempt to be too precise. Quoting a range from 33 to 37 is more realistic than giving GSI = 35. Note that the Hoek-Brown criterion does not apply to structurally controlled failures. Where unfavourably oriented continuous weak planar discontinuities are present, these will dominate the behaviour of the rock mass. The strength of some rock masses is reduced by the presence of groundwater and this can be allowed for by a slight shift to the right in the columns for fair, poor and very poor conditions. Water pressure does not change the value of GSI and it is dealt with by using effective stress analysis.	VERY GOOD - Very Rough, fresh unweathered surfaces GOOD - Rough, slightly weathered surfaces	FAIR - Smooth, moderately weathered and altered surfaces POOR - Very smooth, occasionally slickensided surfaces with compact	fillings with angular Very smooth, slicken-
STRUCTURE		URFACE QUALITY		COMPOSITION AND STRUCTURE			
	90 80 70	N/A	N/A	A. Thick bedded, very blocky sandstone The effect of pelitic coatings on the bedding planes is minimized by the confinement of the rock mass. In shallow tunnels or slopes these bedding planes may cause structurally controlled instability.	70 A		
VERY BLOCKY - interlocked, partially disturbed mass with	OCKING OF ROCK ROCK POLY POLY POLY POLY POLY POLY POLY POLY	50		B. Sand- stone with stone with layers of siltstone amounts  C. Sand- stone and siltstone or silty shale with sand- stone layers shale with sandstone layers	50 B 40	C D	E
BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersection	INTERL	40 30		C.D.E. and G - may be more or less folded than illustrated but this does not change the strength. Tectonic deformation, faulting and loss of continuity moves these categories to F and H.		30 F 20	
rounded rock pieces	DECREASING	20	10	G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers thin sandstone layers  W. Tectonically deformed silty or clayey shale forming a chaotic structure with pockets of clay. Thin layers of sandstone are transformed into small rock pieces.		<b>S</b>	H 10
LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes	V N/A N/A			─────────────────────────────────────			DATE: 8-1

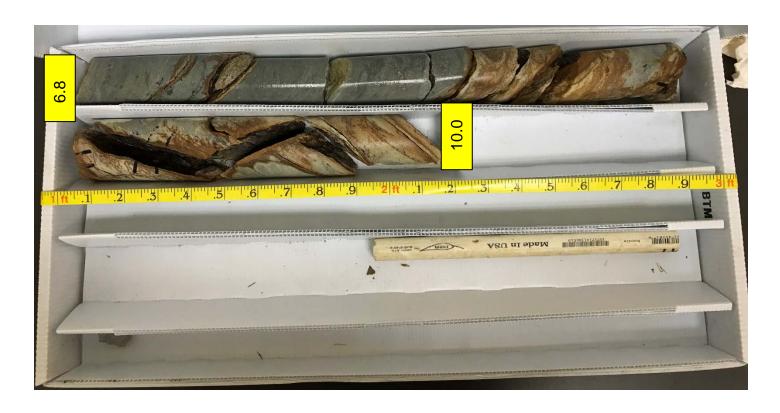


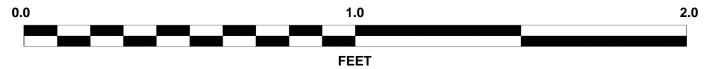


									D	JKE	: <u>L</u>	UG							
WBS	17BP.8.R.12	21		TI	I <b>P</b> 17B	3P.8.F	R.121	COL	JNTY	MOC	RE				GEOLOG	IST Z. Bruce	e		
SITE	DESCRIPTIO	N Rep	olace I	Bridge	No. 63	Over	Buffalo	Creek	on N	IC 22								GROUN	D WTR (
BORI	NG NO. EB1	-A		S.	TATION	21-	+81			OFFSE	T	16 ft LT			ALIGNME	NT -L-		0 HR.	D
COLL	AR ELEV. 3	01.6 ft		Т	OTAL D	EPTH	<b>1</b> 10.0	ft		NORTI	HING	626,6	22		EASTING	1,846,315		24 HR.	D
RILL	. RIG/HAMMER I	EFF./DA	TE IC	CA5794	CME-45	C 87%	05/22/2	017				DRILL I	ЛЕТНО	D H	.S. Augers		HAMM	ER TYPE	Automatio
DRIL	LER Smith, \	Ν.		S.	TART D	ATE	10/31	/17		COMP	DA	TE 10/	31/17		SURFACE	WATER DE	PTH N	A	
LEV	DRIVE DEPTH	1	ow co				BLOWS	S PER F				SAMP.	<b>V</b> /	LO		SOIL AND RO			
(ft)	(ft) (ft)	0.5ft	0.5ft	0.5ft	0	25	<b>i</b>	50		75 	100	NO.	MOI.		ELEV. (ft)				DEPTH
05	+														 - - - 301.6	GPOLIN	ND SURFA	VCE	
300	<del>-</del>	+		+	<del>                                     </del>						•			770	- 301.0	WEATH	IERED RO	CK	
,,,,,	‡														<del>-</del> -	Felsic	Metavolca	nic	
	297.1 4.5	25	60	40/0.2	: :										- -				
295	294.9 + 6.7	60/0.1					• • •		- :		/0.7 /0.1				294.9 294.8/\	ODVOT	NI LINE D	0014	
	‡	00/0.1					: : :				- 1				_ \	Felsic	ALLINE R Metavolca	nic	
		+		+	• •				• •			-			- 291.6		ALLINE R Metavolca		
	+														- Bo	oring Terminate Crystalline Rock	d at Eleva	tion 291.6 t	ft in
	‡														1	) Boring relocat	ed due to	accessibili	ty.
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WRS	17BF	8 R 1	21		TIP	17RP	.8.R.121	C			MOORE		GEOLOGIST Z. Bruce			
				olace Brid									GLOLOGIOT 2. Bruce		GROUN	D WTR (fi
	ING NO			, , , , , , , , , , , , , , , , , , ,	Ť		21+81			_	FSET	16 ft LT	ALIGNMENT -L-		0 HR.	Dr
	LAR EL				+		<b>PTH</b> 10	.0 ft		+		626,622	<b>EASTING</b> 1,846,315		24 HR.	Dr
				TE ICA5						1		DRILL METHOD H.S	I	HAMN	JER TYPE	
	LER S						TE 10/3			СО	MP. DA	TE 10/31/17	SURFACE WATER DE			
	E SIZE				TOTA	AL RUI	N 3.2 ft									
ELEV	RUN ELEV	DEPTI	H RUN	DRILL RATE	REC.	JN RQD	SAMP.	REC	RATA	L		Г		<b>/</b> C		
(ft)	(ft)	(ft)	(ft)	(Min/ft)	REC. (ft) %	(ft) %	NO.	(ft) %	(ft) %	G	ELEV. (1		DESCRIPTION AND REMARK	<u> </u>		DEPTH
(ft) 294.8	294.8 291.6	6.8	(ft) 3.2			(ft) % (1.1) 34%	NO.	(3.0) 94%		G	ELEV. (1	Light greenish gra 6.8'-8.1' to moderate close 7 55° iron stained joi Boring Terminate	Begin Coring @ 6.8 ft CRYSTALLINE ROCK y with light tan-brownish grayely weathered, very hard to he to moderately close fracture into at 6.0'-10.0'; 2 70° iron si 9.0'-9.7', rough joint surfaced at Elevation 291.6 ft in Cry Metavolcanic).  Boring relocated due to access	r, slightly vard Felsic spacing. rained join e rstalline F	: Metavolcar	at nic, 1

EB1-A Box 1 of 1





MES 178P-3R-121	
BORING NO. EB1-B	
COLLAR ELEV. 300.4 ft   TOTAL DEPTH   12.9 ft   NORTHING   626,665   EASTING   1,846,323   24 HR.	VTR (ff
DRILLER Smith, W.  START DATE 10/31/17   COMP. DATE 10/31/17   SURFACE WATER DEPTH N/A    SURFACE WATER DEPTH N/A    SURFACE WATER DEPTH N/A    SOIL AND ROCK DESCRIPTION    SOIL AND ROCK Pelsic Metavolcanic    SOIL AND ROCK DESCRIPTION    SOIL AND	Dr
DRILLER   Smith   W.   START DATE   10/31/17   COMP. DATE   10/31/17   SURFACE WATER DEPTH   N/A	Dr
DRIVE   CLEV   (ft)   DEPTH   BLOW COUNT   (ft)   0.5ft   0.	tomatic
100	
300 300 300.4 GROUND SURFACE  WEATHERED ROCK Felsic Metavolcanic  295 295.4 5.0 100/0.5  290 290.4 10.0 60 40/0.1  287.6 12.8 60/0.1  60/0.1  60/0.1  60/0.1  60/0.1  60/0.1	DEPTH (
295 295.4 5.0   WEATHERED ROCK   Felsic Metavolcanic   296 297.6 12.8   60/0.1   297 287.6   12.8   298 299.4 10.0   299 299.4   299 299.4   29	
295 295.4 5.0 100/0.5  290 290.4 10.0 60 40/0.1  287.6 12.8 60/0.1  60/0.1 60/0.1 Felsic Metavolcanic  CRYSTALLINE ROCK Felsic Metavolcanic  Boring Terminated with Standard Penetration Test Refusal at Elevation 287. ft in Crystalline Rock (Felsic Metavolcanic)	0
290 290.4 10.0 60 40/0.1 100/0.6 287.6 12.8 60/0.1	
290 290.4 10.0 60 40/0.1 100/0.6 287.6 12.8 60/0.1	
287.6 12.8 60/0.1 100/0.6 287.5 CRYSTALLINE ROCK Felsic Metavolcanic Boring Terminated with Standard Penetration Test Refusal at Elevation 287. ft in Crystalline Rock (Felsic Metavolcanic)	
287.6 12.8 60/0.1 60/0.	
287.6 12.8 60/0.1 60/0.1 CRYSTALLINE ROCK Felsic Metavolcanic Boring Terminated with Standard Penetration Test Refusal at Elevation 287. ft in Crystalline Rock (Felsic Metavolcanic)	
60/0.1  CRYSTALLINE ROCK Felsic Metavolcanic Boring Terminated with Standard Penetration Test Refusal at Elevation 287. ft in Crystalline Rock (Felsic Metavolcanic)	12
Boring Terminated with Standard Penetration Test Refusal at Elevation 287. ft in Crystalline Rock (Felsic Metavolcanic)	12
T ft in Crystalline Rock (Felsic Metavolcanic)	J
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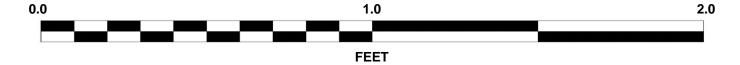
													<u>UG</u>				
WBS	17BP.	.8.R.12	!1		TI	IP	17BP.8	R.121	1	COUNT	TY MO	ORE				GEOLOGIST Z. Bruce	
SITE	DESCR	IPTION	l Rep	lace B	Bridge	No	o. 63 Ove	r Buffa	alo C	reek on	NC 22	!					GROUND WTR (f
BOR	ING NO.	B1-A	١		S.	TΑ	TION 2	3+16			OFF	SET 8	ft RT			ALIGNMENT -L-	<b>0 HR.</b> Dr
COLI	LAR ELE	<b>EV</b> . 28	31.2 ft		T	ОТ	AL DEPT	<b>H</b> 3′	1.8 ft		NOR	THING	626,7	45		<b>EASTING</b> 1,846,254	<b>24 HR</b> . Dr
DRILL	RIG/HAI	MMER E	FF./DA	TE IC	A5794	CN	ИЕ-45C 87	% 05/2	2/2017	7			DRILL N	ИЕТНО	<b>D</b> H.S	. Augers HAMME	ER TYPE Automatic
DRIL	LER S	mith, V	٧.		S <sup>-</sup>	TΑ	RT DATE	11/	02/17	7	СОМ	P. DA	Γ <b>E</b> 11/0	02/17		SURFACE WATER DEPTH N/A	Α
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)		0.5ft	JNT 0.5ft	- (	0 2	BLO	WS P	ER FOO	T 75	100	SAMP. NO.	MOI	L O G	SOIL AND ROCK DESC	
285	- - -	- - -					4								-	281.2 GROUND SURFA	CE (
280	_	-				╟									_	ALLUVIAL Brown and gray, loose, silty,	coarse SAND
<u>275</u>	276.2	-	4	4	2	-	1	774		· / · / ·				М		with gravel (A-2-4	4).
270	271.2	†	45	55/0.3				<u>L</u>		<u> </u>		00/0.8				271.2 WEATHERED RO	
	269.4	11.8	60/0.0									60/0.0				269.4 Felsic Metavolcai  CRYSTALLINE RO	
	-	F						: :								Felsic Metavolca	
265	_	F				$\ \cdot\ $											
	-	Ė															
260	-	‡									:   : :						
200	-	-				╟	<del></del>										
	-	<u> </u>									.		RS-1	1			
255	_	Ł									- 1						
	-	F									.						
	-	F						: :									
250	_	<u> </u>					· · · ·		· ·							249.4	31
																Boring Terminated at Elevat Crystalline Rock (Felsic Me  1) Boring relocated due to a	ion 249.4 ft in etavolcanic).

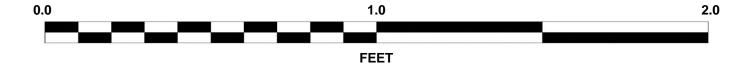
STATION 23+16   OFFSET 8 ft RT   ALIGNMENT -L-   0 HR.   COLLAR ELEV. 281.2 ft   TOTAL DEPTH 31.8 ft   NORTHING 626,745   EASTING 1,846,254   24 HR.   DEPTH   CAS794 CME-45C 87% 05/22/2017   DRILL METHOD H.S. Augers   HAMMER TYPE   Automatic PRILLER Smith, W.   START DATE   11/02/17   COMP. DATE   11/02/17   SURFACE WATER DEPTH   N/A									<u></u>	<u>Ur</u>	RE LUG		
STATION   23+16   OFFSET   8 ft RT   ALIGNMENT   L-   O HR.   COLLAR ELEV.   281.2 ft   TOTAL DEPTH   31.8 ft   NORTHING   626,745   EASTING   1,846,254   24 HR.   DEPTH   CAST94   CMP. DATE   11/02/17   DRILL METHOD   H.S. Augers   HAMMER TYPE   Automation   Aut	WBS	17BP.8.R.12	!1		TIP	17BP	.8.R.121	С	OUNT	Υ ۱	MOORE	GEOLOGIST Z. Bruce	<u>,                                      </u>
COLLAR ELEV. 281.2 ft   TOTAL DEPTH   31.8 ft   NORTHING   626,745   EASTING   1,846,254   24 HR.   ERILL RIG/HAMMER EFF/DATE   ICA5794   CME-45C   87%   05/22/2017   DRILL METHOD   H.S. Augers   HAMMER TYPE   Automatic	SITE	DESCRIPTION	<b>I</b> Rep	olace Brid	lge No	. 63 O	ver Buffa	lo Cre	ek on	_		1	GROUND WTR (ft
RILL RIG/HAMMER EFF, DATE	BOR	ING NO. B1-A	١		STA	TION	23+16			OF	FSET 8 ft RT	ALIGNMENT -L-	<b>0 HR.</b> Dry
START DATE   11/02/17   COMP. DATE   11/02/17   SURFACE WATER DEPTH   N/A	COLI	LAR ELEV. 28	31.2 ft		TOT	AL DE	<b>PTH</b> 31	.8 ft		NO	<b>RTHING</b> 626,745	<b>EASTING</b> 1,846,254	<b>24 HR.</b> Dry
TOTAL RUN   20.0 ft   Continue	DRILL	RIG/HAMMER E	FF./DA	TE ICA5	794 CM	IE-45C	87% 05/22	/2017			DRILL METHOD H.S	S. Augers HAMM	ER TYPE Automatic
LEV   RUN   C(ft)   RUN   (ft)   RUN	DRIL	LER Smith, V	٧.		STA	RT DA	TE 11/0	2/17		СО	<b>MP. DATE</b> 11/02/17	SURFACE WATER DEPTH N/	A
SAMP   RCC   RCD   RCC   RCD   RCC	COR	E SIZE NQ2					<b>N</b> 20.01						
Control   Cont	ELEV	F  F(/         '   '			REC.	RQD		REC.	RQD		Γ	DESCRIPTION AND REMARKS	
269.4   11.8   3.3   N=60/0.9   (3.1)   (2.5)   94%   76%   98%   149   266.1   15.1   2.5   2.6   1.31   (4.9)   (4.2)   98%   84%   1.26   1	(ft)		(ft)		(π) %	(π) %	NO.	(π) %	(π) %				DEPTH (
261.1 20.1   1.40   98%   84%   80   Joint at 23.6 - 24.7; GSI=69   10.8   Joint at 23.6 - 24.7; GSI=69   10.8   Joint at 23.6 - 24.7; GSI=69   10.8   Joint at 23.6   Joint at 24.7; GSI=69   Joint at 24	269.4	269.4 - 11.8	3 3	N=60/0.0	(3.1)	(2.5)		(10.6)	(18.3)		- 260.4	Begin Coring @ 11.8 ft	11.
261.1 20.1   1.40   98%   84%   80   Joint at 23.6 - 24.7; GSI=69   10.8   Joint at 23.6 - 24.7; GSI=69   10.8   Joint at 23.6 - 24.7; GSI=69   10.8   Joint at 23.6   Joint at 24.7; GSI=69   Joint at 24		+	0.5	0:30/0.3	94%				92%		<ul> <li>Light gray-greenish g</li> </ul>	ray, very slightly weathered to fresh, ve	ry hard to hard
5.0 1:34 (5.0) 100% RS-1  256.1 25.1 1:34 1:26  RS-1  5.0 1:36 (5.0) (5.0) 100% RS-1  251.1 30.1 1:41 1:28 1:28 1:28 1:28 1:28 1:29 1:29 1:29 1:29 1:29 1:29 1:29 1:29	265	200.1 15.1	5.0	2:06	(4.9)							llitic texture at 40°-45° discontinuity joir	
5.0 1:34 (5.0) 100% RS-1  256.1 25.1 1:34 1:26  RS-1  5.0 1:36 (5.0) (5.0) 100% RS-1  251.1 30.1 1:41 1:28 1:28 1:28 1:28 1:28 1:29 1:29 1:29 1:29 1:29 1:29 1:29 1:29		‡		1:40 1:25 1:17	98%	84%					- -	80 Joint at 23.6-24.7; GSI=69	
256.1 25.1 1:24 1:24 1:24 1:26 1:26 1:34	000	261.1 20.1		1:26 1:34	(5.0)	(5.0)					- -		
256.1 25.1 1:26 1:34   256.1 25.1 1:36 1:36 1:35 100% 100% 127 1:27 1:28 1:29 1:29 1:29 1:29 1:29 1:29 1:29 1:29	260	‡	5.0	1:34		100%					<del>-</del> -		
255		256 1 + 25 1		1:26			RS-1	1			- -		
250 249.4 31.8 1.7 1:22 (1.6) 94% 94% 249.4 Boring Terminated at Elevation 249.4 ft in Crystalline Rock (Felsic Metavolcanic).	255	230.1 23.1	5.0	1:36							- <del>-</del>		
251.1		‡		1:27	100%	100%					<b>-</b> -		
249.4 — 31.8 0:57/0.7 94% 94% 94% Boring Terminated at Elevation 249.4 ft in Crystalline Rock (Felsic Metavolcanic).	050	251.1 30.1	4.7	1:41	(4.0)	(4.0)					- -		
The state of the s	250	249.4 + 31.8	1.7		94%							ed at Elevation 249.4 ft in Crystalline Ri	31. ock (Felsic
1) Boring relocated due to accessibility.		‡									- -		
		‡									<u>-</u> 1) l	Boring relocated due to accessibility.	
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B1-A Box 1 of 3 B1-A Box 2 of 3



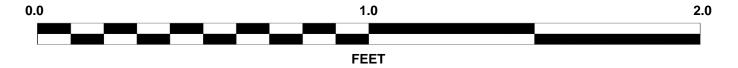






B1-A Box 3 of 3



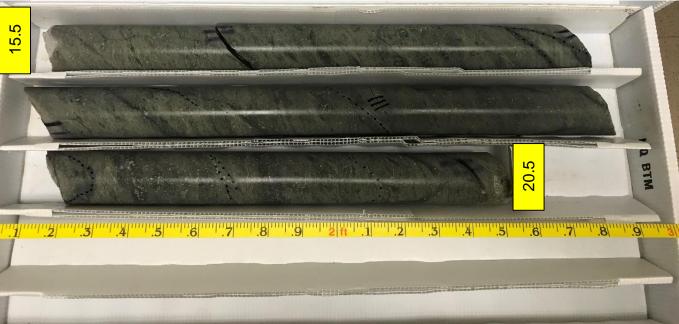


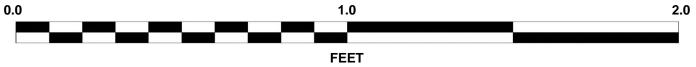
								<u>ORE L</u>	<u> </u>		_				
WBS 1	17BP.	8.R.12	21		7	<b>TIP</b> 17BP.8.F	R.121 <b>COUNT</b>	Y MOORE			GEOLOGI	ST Z. Bruce	e		
SITE DE	ESCR	IPTION	<b>I</b> Rep	olace	Bridge	e No. 63 Over	Buffalo Creek on	NC 22						GROUN	D WTR (ft)
BORING	G NO.	B1-E	3			STATION 23	+10	OFFSET	16 ft RT		ALIGNME	NT -L-		0 HR.	Dry
COLLAR	R ELE	<b>EV</b> . 27	79.8 ft		7	TOTAL DEPTH	<b>l</b> 26.1 ft	NORTHING	626,7	45	EASTING	1,846,264	2	4 HR.	5.1
RILL RI	IG/HAI	MMER E	FF./DA	TE I	CA5794	4 CME-45C 87%	05/22/2017	•	DRILL M	IETHOD +	I.S. Augers		HAMMER	R TYPE	Automatic
RILLE	R S	mith, V	٧.			START DATE	11/01/17	COMP. DA	TE 11/0	)2/17	SURFACE	WATER DE	PTH N/A		
	ORIVE ELEV (ft)	DEPTH (ft)	0.5ft	0.5ff		ft 0 25	BLOWS PER FOOT	75 100	SAMP. NO.	MOI G	ELEV. (ft)	SOIL AND RO	OCK DESCR	RIPTION	DEPTH (f
	- - - - - - - - - - - - - - - - - - -	-	11 60/0.0	19	81			100/1.0	RS-2 /		279.8   273.7  	WEATH Felsic	ND SURFACE IERED ROCE Metavolcani ALLINE ROCE Metavolcani	CK	6.
55	- - - - - - - -	- - - - - - - - - -									- - - - - - - - 253.7	ring Terminate	d at Elevatio	n 253.7 f	26 t in

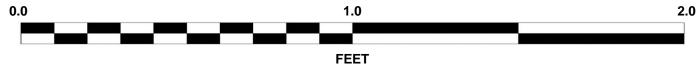
									<u></u>	<u>Ui</u>	RE LUG		
WBS	17BP.8.R	1.121			TIP	17BP	.8.R.121	C	TNUC	<b>Y</b> N	100RE	GEOLOGIST Z. Bruce	
SITE	DESCRIPT	ION	Repl	lace Brid	ge No	. 63 O	ver Buffa	o Cre	ek on	NC 2	22		GROUND WTR (ft)
BOR	I <b>NG NO</b> . B	1-B			STAT	ΓΙΟΝ	23+10			OF	FSET 16 ft RT	ALIGNMENT -L-	<b>0 HR</b> . Dry
COL	LAR ELEV.	279.	8 ft		тот	AL DE	<b>PTH</b> 26.	1 ft		NO	<b>RTHING</b> 626,745	<b>EASTING</b> 1,846,264	<b>24 HR.</b> 5.1
DRILL	RIG/HAMME	R EFF.	./DAT	E ICA57	'94 CM	E-45C	87% 05/22/	2017			DRILL METHOD H.S	S. Augers HAMM	ER TYPE Automatic
DRIL	LER Smith	ո, W.			STAF	RT DA	<b>TE</b> 11/0	1/17		СО	MP. DATE 11/02/17	SURFACE WATER DEPTH N	Ά
COR	E SIZE NO	Q2			TOTA	AL RUI	<b>N</b> 20.0 f	t					
ELEV	RUN DEF	PTH R	RUN	DRILL RATE	REC.	RQD	SAMP.	STR REC.	RQD	ГΟ	Г	DESCRIPTION AND REMARKS	
(ft)	(ft) (f	ft) (	(ft)	(Min/ft)	(ft) %	(ft) %	NO.	(ft) %	(ft) %	Ğ	ELEV. (ft)	DESCRIFTION AND REMARKS	DEPTH (ft
273.7	273.7 _ 6.	1		11 00/0 0	(4.0)	(0.0)		(10.0)	(4= 0)			Begin Coring @ 6.1 ft	
	273.7	. '   '	4.4	1:02/0.4 1:33	(4.3) 98%	(2.3) 52%		100%	(17.2) 86%		- 273.7 - Light gray to greenis	CRYSTALLINE ROCK sh gray, slightly weathered to fresh, ver	6.º y hard to hard
270	269.3 + 10	).5		1:25 2:12			RS-2				_	close to moderately close fracture spaci discontinuities.	
	‡	5	5.0	1:54	(5.0) 100%	(4.7) 94%					- 80° iron stained join discontinuity	t at 6.6'-6.9'; silty clay partings at 7.6' an joints; 8 calcite infilled healed joints; G	nd 8.1'; 13 45° SI=69
265	ļ Ŧ			N=60/0.0 1:02/0.4 1:33 1:25 2:12 1:54 1:54 1:42 1:09 1:58							- -		
	264.3 + 15	5.5	5.0	2:51	(5.0)	(4.8)					<del>-</del> -		
	Ŧ			2:48 3:09	100%	96%					-		
260	259.3 20	).5		2:56 3:08							-  -		
	Ŧ	5	5.0	2:29 1:54	(5.0) 100%	(4.8) 96%					-		
255	]			1:39 1:31							-		
	254.3 + 25 253.7 + 26	5.5 5.1 (	0.6	1:54 1:04/0.6		(0.6)					253.7 Roring Terminat	ed at Elevation 253.7 ft in Crystalline Re	26.
	Ŧ				100%	\100%/					- Bonng reminat	Metavolcanic).	ook (i eisic
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B1-B Box 1 of 3 B1-B Box 2 of 3



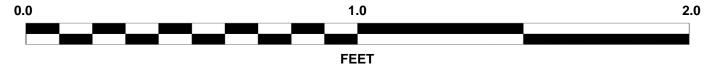






B1-B Box 3 of 3





							_		<u>KE L</u>																									_					
	3 17BP				<b>IP</b> 17BP.8				100RE				GEO	LOGIS	<b>T</b> Z. B	Bruce				_	WBS 17BP.8.R.121					TIP 17BP.8.R.121 COUNTY MOORE						GEOLOGIST Z. Bruce							
					No. 63 Ov		Creek o												WTR (f	` I	· · · · · · · · · · · · · · · · · · ·					dge No. 63 Over Buffalo Creek on NC 22										ROUND WTI	٠.,		
	RING NO				TATION 2				FSET				ALIG	NMENT	T -L-			0 HR.	Dr	¹ I		NO.					TION 23			OFFSI				ALIGNMI					Dry
COL	LAR EL	<b>.EV.</b> 28	3.8 ft	Т	OTAL DEP	<b>TH</b> 11.1	l ft	NOI	RTHING					TING	1,846,2			4 HR.	7.		LLA	RELEV	. 282	2.7 ft		тот	AL DEPT	<b>1</b> 12.5 ft		NORT		626,78		EASTING	1,846				7.6
DRIL	L RIG/HA	MMER E	FF./DATE	ICA5794	CME-45C 8	7% 05/22/2	2017			DRILL	METHO	DD H	.S. Auger	rs .		H	HAMMER	RTYPE	Automatic	DR	ILL RI	G/HAMN	IER EFI	F./DATE	ICA57	794 CN	/IE-45C 87%	05/22/2017	7			DRILL ME	ETHOD	I.S. Augers		I	HAMMER 1	YPE Autom	atic
DRIL	LLER S				TART DAT				MP. DA			4	SURI	FACE V	VATER	R DEPTH	H N/A			DF		R Sm					RT DATE				. DATE	E 11/0	1/17	SURFAC	E WATE	R DEPT	H N/A		
ELEV (ft)	(ft)	DEPTH (ft)	0.5ft 0.5		0	BLOWS 25	S PER FOO	75 75	100	NO.	/	0	ELEV. (1	(ft)	SOIL AN	ND ROCK	( DESCRI	IPTION	DEPTH		,		–⊢		COUNT 0.5ft 0.s		0 25	BLOWS P	PER FOO	T 75	100	NO.	MOI G		SOIL A	AND ROCK	( DESCRIP	TION	
285	279.0	4.8	53 47/i 60/0.1	6	- 10 · · · · · · · · · · · · · · · · · ·				-100/0.9 60/0.1	1	M		283.8	Tan, E Penett ft in C	WE FE CRYSTORY Tration To Crystalling	EATHERI elsic Meta elsic Meta elsic Meta Ferminate est Refus ne Rock (I	WBANKM  If, mediur   MENT m plasticit A-6).  K C C K	1: 1: 2.7 c).	28	5 2		5.0		55 45/	/0.4					0/0.9			270.3 270.2 270.2	C  Boring enetration	Felsic Mel  RYSTALL Felsic Mel Terminate Test Refu	SURFACE ED ROCK tavolcanic  LINE ROCK tavolcanic ed with Star sal at Eleva Felsic Meta	ndard	12.4	
OT BORE DOUBLE 17BP.8.R121_GEO_BRDG0063.GPJ NC_DOT.GDT 12/22/17		<del></del>																				<del></del>																	

#### LABORATORY SUMMARY SHEET FOR ROCK CORE SAMPLES

WBS NO.: SHEET 20

TIP NO.: 17BP.8.R.121 ProjectID:

**COUNTY: Moore** 

Replace Bridge No. 63 Over Buffalo Creek on NC 22

								Unit	Unconfined	Young's	Splitting Tensile	
				Geologic	Run			Weight	Compressive	Modulus	Strength	
Sample #	Boring #	Depth (ft)	Rock Type	Map Unit	RQD	Length (ft)	Diameter (ft)	(PCF)	Strength (PSI)	(PSI)	(PSI)	Remarks
RS-1	B1-A	22.3-22.7	Felsic Metavolcanic	CZfv	100%	4.76	1.98	169.05	16,662	N/A	N/A	fresh
RS-2	B1-B	9.5-9.9	Felsic Metavolcanic	CZfv	52%	4.63	1.97	168.18	6,868	N/A	N/A	sli. weathered to fresh

HDR, CERT. No. 102-0603

Don Schmidt, CERT. No. 102-03-0603

Michael Garrison, CERT. No. 102-02-0603

#### SITE PHOTOGRAPHIC RECORD

**Looking Northwest** 



**Looking Northwest Along NC 22** 



**Looking Southeast along NC 22** 



**Looking Upstream Buffalo Creek** 

